

CHAPTER 12

INTERIOR ENVIRONMENT

780 CMR 1201.0 GENERAL

1201.1 Scope: The provisions of 780 CMR 12 shall govern the means of light, *ventilation*, sound transmission control and rat-proofing required in all buildings.

1201.2 Buildings on same lot: Where more than one building is hereafter placed on a *lot*, or where a building is placed on the same lot with *existing buildings* and the several buildings are treated as a single structure for the purposes of 780 CMR 12, equivalent uncovered *lot* area or other adequate sources of light and *ventilation* shall be provided for all occupied buildings.

780 CMR 1202.0 DEFINITIONS

1202.1 General: The following words and terms shall, for the purposes of 780 CMR 12 and as used elsewhere in 780 CMR, have the meanings shown herein.

Attic: The space between the ceiling beams of the top story and the roof rafters.

Court: An open, uncovered and unoccupied space on the same *lot* as a building where such space is enclosed wholly or partly by buildings, walls or other enclosing devices (see 780 CMR 1212.0).

Inner: Any *court* enclosed wholly by buildings, *walls* or other enclosing devices.

Outer: A *court* extending to and opening upon a street, public alley or other approved open space that is not less than 15 feet (4572 mm) wide, or upon a required yard.

Court height: The vertical distance from the lowest level of the *court* to the mean height of the top of the enclosing *walls*.

Court width: As applied to an *inner court*, means the least horizontal dimension. As applied to an

outer court, means the shortest horizontal dimension measured in a direction substantially parallel with the principal open end of such *court*.

Habitable space: Space in a structure for living, sleeping, eating or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

Occupiable space: A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes, or in which occupants are engaged at labor; and which is equipped with *means of egress* and light and *ventilation* facilities meeting the requirements of 780 CMR.

Vapor retarder: A material having a perm rating of 1.0 or less, such as foil, plastic sheeting, or insulation facing, installed to retard the passage of water vapor or moisture through the *exterior envelope*.

Ventilation: The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

Yard: An unoccupied open space other than a *court* (see 780 CMR 1212.0 and 1213.0).

780 CMR 1203.0 CONSTRUCTION DOCUMENTS

1203.1 General: *Construction documents* for all buildings and structures that are designed for human occupancy, other than buildings with occupancies in Use Groups I-1, R-2 and R-3, shall designate the number of occupants to be accommodated in the various rooms and spaces; where means of artificial lighting and *ventilation* are required, the application shall include sufficient details and description of the mechanical system to be installed as herein required

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or as specified in the mechanical code listed in *Appendix A*.

780 CMR 1204.0 ROOM DIMENSIONS

1204.1 Ceiling heights: *Habitable (spaces)* rooms other than kitchens shall have a ceiling height of not less than seven feet six inches (2286 mm). Hallways, *corridors*, bathrooms, toilet rooms, kitchens, laundry rooms and *habitable basements* that are only used as recreation rooms shall have a ceiling height of not less than seven feet (2134 mm) measured to the lowest projection from the ceiling.

1204.1.2 Sloping ceilings: If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in one-half the area thereof. Any portion of the room measuring less than five feet (1524 mm) from the finished floor to the finished ceiling shall not be included in any computation of the minimum area thereof.

1204.1.3 Furred ceilings: If any room has a furred ceiling, the prescribed ceiling height is required in two-thirds of the area thereof, but the height of the furred ceiling shall not be less than seven feet (2134 mm).

1204.2 Floor area: *Habitable* rooms, except kitchens, shall have an area of not less than 70 square feet (6.51 m²).

1204.3 Width: A *habitable* room other than a kitchen shall not be less than seven feet (2134 mm) in any dimension.

**780 CMR 1205.0 LIGHT AND
VENTILATION
REQUIRED**

Exception: In occupancies in Use Group R-3, the maximum projection below the required ceiling height of beams and girders spaced not less than four feet (1219 mm) on center shall be six inches (152 mm).

1204.1.1 Use Groups A, B, E and M: A clear height from the finished floor to the finished ceiling or lowest projection of not less than seven feet six inches (2286 mm) shall be provided in all exit access and occupiable rooms of structures of Use Groups A, B, E and M.

1205.1 Light required: Every room or space intended for human occupancy shall be provided with natural or artificial light.

1205.1.1 Bathroom and toilet room lighting: Every bathroom and toilet room shall be provided with artificial light. The illumination shall have an average intensity of three footcandles (32.29 lux) measured at a level of 30 inches (762 mm) above the floor.

1205.2 Ventilation required: Every room or space intended for human occupancy shall be provided with natural or mechanical *ventilation*.

1205.2.1: *Every bathroom containing a bathtub and/or shower shall be equipped with a mechanical exhaust fan and associated ductwork with the fan exhausting, at such rates as specified in the BOCA National Mechanical Code/1993 as referenced in Appendix A. Passive ventilation methods such as openable windows shall not substitute for ventilation. Such bathroom exhaust shall vent directly to the outside and no exhaust vent shall terminate in attics or other interior portions of the building.*

Note: See also 105 CMR 410.000

780 CMR 1206.0 NATURAL LIGHT

1206.1 General: *Should natural lighting be chosen as a lighting option*, in the application of the provisions of 780 CMR 12, the standard of natural light for all *habitable* and *occupiable rooms*, unless otherwise specifically required by the provisions of 780 CMR 4 for special occupancies, shall be based on 250 footcandles (2691 lux) of illumination on the vertical plane adjacent to the exterior of the light-transmitting device in the enclosure *wall* and shall be adequate to provide an average illumination of six footcandles (64.58 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

1206.2 Minimum glazing area: Every room or space intended for human occupancy shall have an exterior glazing area of not less than 8% of the floor area. Natural light shall be provided by glazing areas that open onto *courts* or yards which comply with the requirements of 780 CMR 1212.0, or by other approved means.

1206.2.1 Adjoining spaces: Where natural light for rooms or spaces without exterior glazing areas is provided through an adjoining room, the unobstructed opening to the adjoining room shall be at least 8% of the floor area of the interior room or space, but not less than 25 square feet (2.33 m²). The exterior glazing area shall be based on the total floor area being served.

1206.3 Stairways: Interior *stairways* shall be provided with an exterior glazing area of not less than ten square feet (0.93 m²) on every floor through which the *stairway* passes.

1208.2.2 Openings below grade: Openings below grade shall be acceptable for natural *ventilation* provided that the outside horizontal clear space measured perpendicular to the opening is 1½ times the depth below the average adjoining grade.

1208.3 Contaminants exhausted: Contaminants in the breathing atmosphere shall be exhausted to the

1206.4 Hallways: Natural light shall be capable of penetrating the full length of the hallway.

780 CMR 1207.0 ARTIFICIAL LIGHT

1207.1 General: *Should artificial lighting be chosen as a lighting option*, artificial light shall be capable of providing the minimum illumination specified for natural light.

780 CMR 1208.0 NATURAL VENTILATION

1208.1 General: *Should natural ventilation be chosen as a ventilation option*, natural *ventilation* of an occupied space shall be through windows, doors, louvers or other natural openings to the outdoor air.

Exception: All occupancies shall have mechanical *ventilation* in bathrooms and toilet rooms as specified in 780 CMR 1205.2.1.

1208.2 Ventilation area required: The minimum openable area to the outdoors shall be 4% of the floor area being *ventilated*.

1208.2.1 Adjoining spaces: Where rooms and spaces without openings to the outdoors are *ventilated* through an adjoining room, the unobstructed opening to the adjoining room shall be at least 8% of the floor area of the interior room or space, but not less than 25 square feet (2.33 m²). The *ventilation* openings to the outdoors shall be based on the total floor area being *ventilated*.

outdoor air in accordance with the mechanical code listed in *Appendix A*.

1208.4 Openings onto yards or courts: Natural *ventilation* shall be provided by openings onto yards or *courts* which comply with the requirements of 780 CMR 1212.0, or by other approved means.

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**780 CMR 1209.0 MECHANICAL
VENTILATION**

1209.1 General: *Should mechanical ventilation be chosen as the ventilation option*, mechanical ventilation shall conform to the requirements of the mechanical code listed in *Appendix A*.

Note: Also see 780 CMR 1205.2.1

**780 CMR 1210.0 VENTILATION OF
SPECIAL SPACES**

1210.1 Roof spaces: Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, shall have cross *ventilation* for each separate space by *ventilation* openings that are protected against the entrance of rain and snow. The openings shall be covered with corrosion-resistant mesh not less than ¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

1210.1.1 Ventilating area: The minimum required net free ventilating area shall be 1/150 of the area of the space *ventilated*, except that the minimum required area shall be reduced to 1/300, provided that: a *vapor retarder* having a permeance not exceeding one perm is installed on the warm side of the ceiling; or at least 50%, and not more than 80%, of the required ventilating area is provided by ventilators located in the upper portion of the space to be *ventilated* at least three feet (914 mm) above eave or cornice vents, with the balance of the required *ventilation* provided by eave or cornice vents.

1210.2 Crawl spaces: Crawl space areas, other than those used as an underfloor plenum, shall be *ventilated* by an approved mechanical means or by openings in exterior *foundation walls*. Openings shall be located as close to corners as practicable and shall provide cross *ventilation* on at least two approximately opposite sides. The openings shall be covered with corrosion-resistant mesh not less than

¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

1210.2.1 Opening size: Openings shall have a net area of not less than one square foot (0.093 m²) for each 150 square feet (13.95 m²) of foundation space. Where an approved *vapor retarder* is installed over the ground surface, the required net area of openings shall be reduced to 0.1 square foot (0.093 m²) for each 150 square feet (13.95 m²) and vents shall have manually operable louvers.

1210.3 Alternative mechanical ventilation: Enclosed *attic*, rafter and crawl spaces which are not *ventilated* as herein required shall be equipped with a mechanical *ventilation* system conforming to the requirements of the mechanical code listed in *Appendix A*.

**780 CMR 1211.0 ACCESS TO CRAWL
SPACES AND ATTICS**

1211.1 Access to crawl spaces: Access shall be provided to crawl spaces by an opening not less than 18 inches (457 mm) by 24 inches (610 mm). *Such access, if common to conditioned space, shall be weatherstripped and shall close tightly.*

1211.2 Access to attics: An opening not less than 22 inches by 30 inches (559 mm by 762 mm) with ready access thereto shall be provided to any *attic* area having a clear height of over 30 inches (762 mm). *Such access, if adjoining conditioned space, shall be weatherstripped, and close tightly. All such access opening framing joints shall be caulked, gasketed, weatherstripped, foamed or otherwise sealed to limit infiltration/exfiltration.* Where doors or other openings are installed in attic *draftstopping*, such doors shall be self-closing and be of approved materials as specified in 780 CMR 1211.0, and the construction shall be tightly fitted around all pipes, ducts or other assemblies piercing the *draftstopping*.

780 CMR 1212.0 COURTS AND YARDS

1212.1 General: All *courts* and yards required to serve rooms for natural light or *ventilation* purposes shall comply with the requirements of 780 CMR 1212.0.

1212.2 Minimum width: Every such *court* or yard shall have a minimum width of three inches (76 mm) for each one foot (305 mm) of height or fraction

1212.3 Area of court: The cross-sectional area of a required *court* shall not be less than 1½ times the square of its width; nor shall the length of any *court* be more than twice its width.

1212.4 Access to court: A door or other means of access shall be provided at the bottom of every *court* that is not otherwise provided with convenient access for purposes of cleaning.

1212.5 Air intakes: Every *court* which serves one or more *habitable* rooms and which does not open for its full height on one or more sides to a street or legal yard, shall be connected at or near the bottom with a street or yard by a horizontal intake or passage of fire-resistance rated construction. Such intake or passage shall have a cross-sectional area of not less than 21 square feet (1.95 m²) and shall remain fully open at both ends and unobstructed for its full size and length, except that grilles of noncombustible construction are permitted at the ends of the intake.

1212.5.1 Fire-resistance rating: The *walls*, floors and ceilings of such intakes or passages shall have a fire-resistance rating of not less than two hours in buildings of Type 1, 2, 3 or 4 construction and not less than a one-hour *fire-resistance rating* in buildings of Type 5 construction.

1212.6 Court walls: Where, in the opinion of the code official, windows facing on *courts* do not receive adequate direct light by reason of peculiar arrangement or orientation, the code official shall

thereof, but not less than five feet (1524 mm) for *outer courts* and twice these values for *inner courts*.

1212.2.1 Irregular court or yard width: In the case of irregular or gore-shaped *courts* or yards, the average width shall not be less than the required width of a *court* in accordance with 780 CMR 1212.2, but shall not be less than five feet (1524 mm) at any point.

require the *walls* to be constructed of light-colored masonry, or to be painted and maintained a light color to furnish additional reflected light, or shall require other approved means of providing additional light.

1212.7 Court drainage: The bottom of every *court* shall be properly graded and drained to a public sewer or other approved disposal system complying with the plumbing code listed in *Appendix A*; and shall be paved with concrete or other non-absorbent material where required by the code official.

780 CMR 1213.0 OBSTRUCTION OF COURTS AND YARDS

1213.1 Permissible projections: Every required *court* and yard shall remain unobstructed for its required area and full height, except for the projections permitted in 780 CMR 1213.2 through 1213.7.

1213.2 Maximum encroachment: A part of any building or structure shall not extend into side *courts*, *inner courts* or yards required for light and *ventilation* of *habitable* and *occupiable rooms* by the *zoning* law or other statutes controlling building construction. The encroachment shall not exceed 20% of the legal area of the yard or *court* which is required for light and *ventilation* purposes.

1213.3 Accessories: In Use Groups R and I, clothes poles, arbors, garden trellises and other such

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accessories shall not be prohibited in the open spaces at ground level.

1213.4 Roof eaves: Roof eaves shall not project more than three feet (914 mm) beyond the face of the *wall*.

1213.5 Steps and architectural features: Steps, window sills, belt courses and similar architectural features, as well as rain leaders and chimneys, shall not project more than two feet (610 mm) beyond the face of the *wall*.

1213.6 Exterior stairways and fire escapes: Outside *stairways*, smokeproof tower balconies, fire escapes or other required elements of a *means of egress* shall not project more than four feet (1219 mm) beyond the face of the *wall*.

1213.7 Motor vehicle parking: Where approved, required *court* and yard areas for automobile parking spaces or *private garages* not exceeding one story in *height* where accessory to and only for the occupants of a Use Group R occupancy are permitted, provided that required windows for light and *ventilation* are not obstructed thereby.

780 CMR 1214.0 SOUND TRANSMISSION CONTROL IN RESIDENTIAL BUILDINGS

1214.1 Scope: 780 CMR 1214.0 shall apply to all common interior *walls*, partitions and floor/ceiling assemblies between adjacent *dwelling units* or between *dwelling units* and adjacent public areas such as halls, *corridors*, stairs or service areas in all occupancies in Use Group R.

1214.2 Air-borne noise: *Walls*, partitions and floor/ceiling assemblies separating *dwelling units* from each other or from public or service areas shall have a sound transmission class (STC) of not less than 45 for air-borne noise when tested in accordance with ASTM E90 listed in *Appendix A*. This requirement shall not apply to *dwelling unit*

entrance doors; however, such doors shall be tight fitting to the frame and sill.

1214.3 Structure-borne sound: Floor/ceiling assemblies between *dwelling units* or between a *dwelling unit* and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 45 when tested in accordance with ASTM E492 listed in *Appendix A*.

780 CMR 1215.0 RATPROOFING

1215.1 Ratproofing: All buildings or structures and the *walls* enclosing *habitable* or *occupiable rooms* and spaces in which persons live, sleep or work, or in which feed, food or foodstuffs are stored, prepared, processed, served or sold, shall be constructed in accordance with the provisions of 780 CMR 1215.0.

1215.2 Grade protection: Buildings not provided with a continuous foundation shall be provided with protection against rodents at grade in accordance with either 780 CMR 1215.2.1 or 1215.2.2.

1215.2.1 Apron: Where an apron is provided, the apron shall not be less than eight inches (203 mm) above, nor less than 24 inches (610 mm) below grade. In all cases the apron shall not terminate below the lower edge of the siding material. The apron shall be constructed of an approved nondecayable, water-resistant and ratproofing material of required strength and shall be installed around the entire perimeter of the building. Where constructed of masonry or concrete materials, the apron shall not be less than four inches (102 mm) in thickness.

1215.2.2 Grade floors: Where continuous concrete grade floor slabs are provided, open spaces shall not be left between the slab and *walls*, and all openings in the slab shall be protected.

1215.3 Opening protection: Openings shall be protected in accordance with 780 CMR 1215.3.1 through 1215.3.3.

1215.3.1 Wall openings: Openings in the *wall* or apron required for *ventilation* or other purposes shall be guarded with corrosion-resistant ratproof shields of not less than nominal 0.034-inch perforated steel sheets, or No. 20 B&S Gage aluminum (0.032 inch) or nominal 0.064-inch expanded steel or wire mesh screens, with not more than 1/2-inch (13 mm) mesh openings.

1215.3.2 Slab openings: Access openings in grade floor slabs shall be protected with concrete, masonry, metal or other corrosion-resistant noncombustible cover of adequate strength to support the floor *loads*.

1215.3.3 Pipe and conduit openings: All openings for pipe, conduit, cable and similar purposes at or near grade shall have snugly fitted collars to eliminate all open spaces.

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